



ADVANCED PAVEMENTS TESTING SYSTEMS

# DUCTIMETER

Determination of Ductility



CUSTOMER'S VALUE  
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# Determination of ductility

81-PV10A02  
**Standard version**

81-PV10B02  
**High performance version**

81-PV10C12  
**Research version**

The ductility test is performed for determining the ductility of bituminous materials by measuring the elongation before breaking when two ends of briquette specimens are pulled apart at a specified speed and temperature.

- 81-PV10A02 **Standard version** complies and exceeds the ASTM D113, D6084, AASHTO T51 and EN 13398 Standards which require the test to be performed in water at a temperature of  $25^{\circ} \pm 0.5^{\circ}\text{C}$  (ASTM/AASHTO) or  $25^{\circ} \pm 0.2^{\circ}\text{C}$  (EN) at a constant speed of 50 mm/min.
- 81-PV10B02 **High performance version** also satisfies EN 13589 and EN 13703 which require the test to be performed from  $4^{\circ}$  to  $30^{\circ}\text{C}$   $\pm 0.2^{\circ}\text{C}$  at a testing speed adjustable up to 100 mm/min, and the determination of the tensile properties of modified bitumen.
- 81-PV10C12 **Research version** exceeds all the above mentioned Standards requirements, and it is fully dedicated to research.

**81-PV10A02**  
**Standard version**



**main features**

- > 4 tension lines (briquette capacity) x 1500 mm
- > Easy and free access to the large testing space
- > Closed-loop PID temperature control system
- > Stainless steel insulated water bath
- > Exclusive in-built thermoregulation system compensating the exchange of heat and cooling, resulting in very strict temperature control, optimized by the connection to chiller (optional)
- > Adjustable speed range from 5 to 100 mm/min
- > High carriage return speed of 500 mm/min for greater productivity
- > Elongation measurement by encoder read on display

**Standards** ASTM D113 | ASTM D6084 | AASTHO T51 | EN 13398 | EN 13589 | EN 13703

**81-PV10A02**

**Standard version**

This model fully satisfies and exceeds ASTM D113, ASTM D6084, AASTHO T51 and EN 13398 requirements. To obtain the required 25°C with  $\pm 0.2^\circ\text{C}$  tolerance, circulation of cold water is necessary. A water chiller (see accessory 81-PV1002) is ideal for this and may already be available in the laboratory but mains water can also be used. If the ambient temperature goes over 25°C, as in tropical areas, and cold mains water is not available, the use of a water chiller is mandatory.



Detail of the stainless steel water bath with the protection for the lateral driving screw rods, by stainless steel too.

**Water bath**

Insulated stainless steel water bath with a heating system located over the entire base surface and a cooling coil (for connection to water mains or chiller) distributed over the three side walls assuring temperature uniformity without water turbulence inside the bath.

All parts in contact with water are made of stainless steel.

**Carriage displacement**

Double-screw rods and mobile carriage enable test speeds from 5 to 100 mm/min. The system also permits the fast return of the carriage at the end of the test (500 mm/min) to reduce down time and increase productivity. The carriage return is automatic so manual intervention is not required.

**Temperature control**

- A closed-loop PID system assures constant temperature within  $\pm 0.2^\circ\text{C}$ .
- Plate-type base heaters give better temperature uniformity.
- The thermoregulation system is based on controlling the heater (which increases the temperature of the bath) and the flow rate of the cooling coil (which decreases the temperature).

This important feature assures control of the temperature within strict limits and permits the use of suitable standard water chillers.

**Machine control and elongation measurement**

Control panel with digital display to set the testing speed: 5 to 100 mm/min, with the carriage return function. Elongation measurement by encoder.

**Optional transparent cover**

The machine can be completed with a transparent cover.

**Ordering information**

**81-PV10A02**

DUCTIMETER  
 Ductility testing machine.  
 4-briquette capacity, 1500 mm carriage travel,  
 5 to 100 mm/min adjustable testing speed.  
 230 V, 50-60 Hz, 1 ph.

**81-PV10A04**

As above but 110 V, 60 Hz, 1 ph.

**Upgrading option**

**81-PV10030**

Transparent machine cover  
 For technical specifications, refer to page 7.

**81-PV10B02**

**High performance version**



**main features**

- > 4 tension lines (briquette capacity) x 1500 mm
- > Easy and free access to the large testing space
- > Double drive screw rod
- > Closed-loop PID temperature control system
- > Stainless steel insulated water bath
- > Exclusive in-built thermoregulation system compensating the control, optimized by the connection to chiller (optional)
- > High carriage return speed of 500 mm/min for greater productivity
- > Adjustable speed range from 5 to 100 mm/min
- > PC-controlled using dedicated software
- > Includes a system for measuring forces up to 4x300 N with load cells (see accessories)
- > Temperature range at  $25 \pm 0.2^\circ\text{C}$  and from 4 to  $30 \pm 0.2^\circ\text{C}$
- > Elongation measurement system by encoder
- > Real-time load and displacement graphics via PC

**Standards** EN 13589 | EN 13703

**81-PV10B02**

**Force-ductility**

**High performance version**

**Machine control**

By PC (not included).

**Water bath**

Insulated stainless steel water bath with a heating system located over the entire base surface and a stainless steel cooling coil (for connection to water mains or chiller) distributed over the three side walls assuring temperature uniformity without water turbulence inside the bath. All parts in contact with water are made of stainless steel.

**Carriage displacement**

Double-screw rods and mobile carriage enable test speeds from 5 to 100 mm/min. The system also permits the fast return of the carriage at the end of the test (500 mm/min) to reduce down time and increase productivity. The carriage return is automatic, manual intervention is not required.

**Temperature control**

- A closed-loop PID system assures constant temperature of  $25 \pm 0.2^\circ\text{C}$ .

- Temperature range from 4 to  $30^\circ\text{C} \pm 0.2^\circ\text{C}$  with a water chiller (see accessories p7)
- Stainless steel cooling coil
- Plate-type base heaters give better temperature uniformity.
- The thermoregulation system is based on control of the heater (which increases the temperature of the bath) and the control of the flow rate of the cooling coil by an electro-valve. This important feature assures control of the temperature within strict limits and permits the use of suitable standard water chillers.

**Load and elongation measurement**

Automatic measurement of the elongation by an encoder and of the test load of the four testing lines with load cells (not included).

**Testing software**

- Selection of test parameters (speed, temperature etc.) by PC. The test temperature, however, can be set in advance using the control panel of the machine.
- Test control by PC: Start-Stop-Carriage return
- Specimen failure recognition
- Real-time display of load/elongation graph with advanced visualization options (single or multi-graph).
- Data acquisition and processing conforming to Standards
- Function for multiple test data comparison
- Storage of test data

**Water cooling**

This model is proposed without a chiller (81-PV1002-04) for use with a suitable cooling system that could be available in the laboratory. It is important however, that this unit is capable of delivering a flow rate of 6 litres/min, 1 bar, at the minimum temperature of  $2^\circ\text{C}$ .

**See-through cover**

Essential for better temperature control of the bath.

**Ordering information**

**81-PV10B02**

**DUCTIMETER**

High Performance Ductility testing machine.

PC controlled, 4-briquette capacity, 1500 mm carriage travel, adjustable testing speed from 5 to 100 mm/min, thermostatically controlled water bath at  $25^\circ\text{C} \pm 0.2^\circ\text{C}$  and from  $4^\circ$  to  $30^\circ \pm 0.2^\circ\text{C}$ , force measurement facility up to 300 N per line.

230 V, 50-60 Hz, 1 ph.

**81-PV10B04**

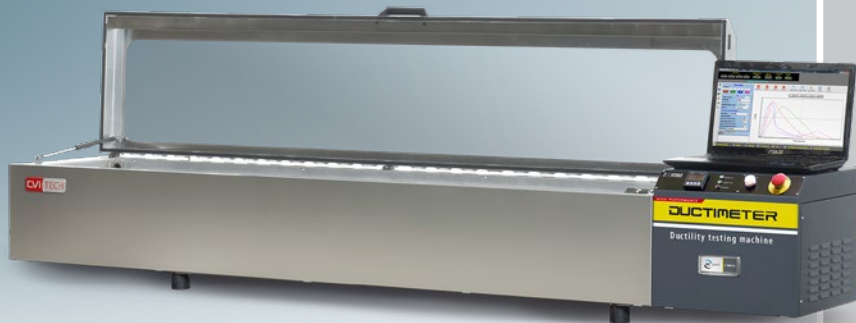
As above but 110 V, 60 Hz, 1 ph.

For technical specifications please refer to page 7.



Typical screenshot of the machine software

**81-PV10C12**  
Research version



**Additional main features**

- > Includes a system for measuring forces up to 2000 N (4x500 N) with load cells (refer to accessories p 7)
- > Temperature range from -10 to 60 ±0.2°C
- > Speed range adjustable from 1 to 200 mm/min
- > Extensive use of stainless steel for frame, cover and tank

**Standards** EN 13589 | EN 13703

**81-PV10C12**

**Force-ductility**

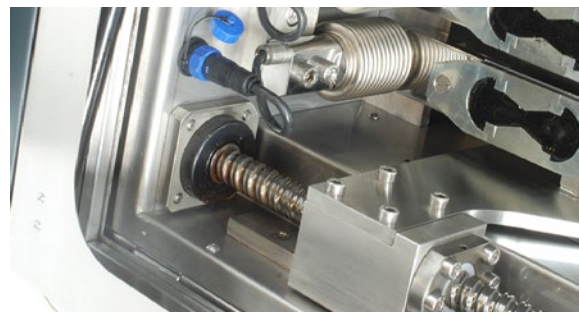
**Research version**

This research version further increases the high performance of the 81-PV10B02 model by more advanced specifications concerning temperature control, speed range and max. tension force, together with an extended use of stainless steel: frame, tank, cooling coil and cover. These features make this version ideal for research purposes. See specifications on page 536 of the IPC Global's catalogue.

As the high performance version 81-PV10B02, this research model is PC controlled using dedicated software.



Typical screenshot of the machine software



Detail of 81-PV10B02 and PV10C12 with four 81-PV10020 load cells and briquette molds

Detail of water bath.  
Easy and free access to the large testing space, common to all versions



**Ordering information**

**81-PV10C12**

DUCTI-METER  
Research Ductility testing machine.  
PC controlled, 4-briquette capacity, 1500 mm carriage travel, adjustable testing speed from 1 to 200 mm/min, thermostatically controlled water bath from -10° to 60° ±0.2°C, force measurement facility up to 500 N per line. 230 V, 50-60 Hz, 1 ph.

**81-PV10C14**

As 81-PV10C14 but 110 V, 60 Hz, 1 ph.

**Note:** Briquette molds, Load cells and Water cooling system are not included and should be ordered separately. See accessories.

### Technical Specifications

Models	81-PV10A02 81-PV10A04	81-PV10B02 81-PV10B04	81-PV10C12 81-PV10C14
Conforms to Standards	EN 13398 ASTM D113 ASTM D6084 AASHTO T51	EN 13398 EN 13589 EN 13703 ASTM D113, ASTM D6084, AASHTO T51, AASHTO T300	EN 13398 EN 13589 EN 13703 ASTM D113, ASTM D6084, AASHTO T51, AASHTO T300
Machine control by	Digital display panel	PC with dedicated Software (PC not included)	PC with dedicated Software (PC not included)
Thermostatically controlled water bath temperature:	at 25±0.2°C	at 25±0.2°C and from 4 to 30±0.2°C with water chiller (see accessories below)	from -10 to 60 ±0.2°C with water chiller (see accessories below). PID closed-loop control.
Temperature control system	Heater and cooling coil for connection to cold water or water chiller	Heater and cooling coil for connection to cold water or water chiller	Heater and cooling coil for connection to cold water or water chiller
Structure	Stainless steel tank	Stainless steel tank	Extensive use of stainless steel for frame, tank, cooling coil and cover
Briquette capacity	4		
Max carriage travel	1,500 mm		
Testing speed	Adjustable from 5 to 100 mm/min	Adjustable from 5 to 100 mm/min	Adjustable from 1 to 200 mm/min
Elongation measurement by	Encoder (Linear scale)	Encoder (Optical system)	Optical system
Max. load and tension load measurement	--	1,200 N (4 x 300 N) by load cells (500N capacity.) (Cells not included, see accessories)	4 x 500 N by load cells (2,000 N in total). (Cells not included, see accessories)
Tension load/elongation graph	--	Real-time graphs by PC	Real-time graphs by PC
Carriage return speed	500 mm/min		
Power rating (approx.)	1200 W		
Transparent cover	not included	included	included
Overall dimensions	(L x D x H) 2,434 x 412 x 385 mm		
Weight (approx.)	100 kg		

#### Accessories

Ductility briquette molds

#### **81-B0141**

Briquette mold conforming to EN 13389



Briquette molds

#### **81-B0141/A**

Briquette mold conforming to ASTM D6084

#### **81-B0141/B**

Briquette mold conforming to ASTM D113 and AASHTO T51

#### **81-B0141/E**

Briquette mold conforming to EN 13589

#### **81-B0142**

Ductility mold plate

#### Water chillers

Specifications  
Pump water flow (maximum): 6 liters/min  
Dimensions: 450 x 450 x 825 mm (W x D x H)  
Weight: approx. 35 kg

#### **81-PV1002**

(for 81-PV10B02 + 81-PV10A02)  
Water chiller, flow rate 6 litres/min, 2°C minimum temperature. 1200 W, 230 V, 50-60 Hz, 1 ph.

#### **81-PV1004**

(for 81-PV10B04 + 81-PV10A04) Water chiller, same as above but 110 V, 60 Hz, 1 ph.



81-PV1002

#### **81-PV1012**

(for 81-PV10C12)  
Fluid chiller, flow rate 6 litres/min, -20°C minimum temperature. 1200 W, 230 V, 50-60 Hz, 1 ph.

#### **81-PV1014**

(for 81-PV10C14)  
Same as above but 1200W, 110V, 60 Hz, 1 ph.

#### Load cells

(for use with 81-PV10B02, 81-PV10B04, 81-PV10C12 and 81-PV10C14 versions only)

#### **81-PV10020**

High precision strain gauge load cell 0-500 N capacity

#### Machine base

#### **81-PV10010**

Support base for ductility machine, stainless steel table  
Dimensions (L x D x H): 2,370 x 600 x 670 mm  
Weight: approx. 50 kg

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